

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 31 23 10 – Excavating, Trenching and Backfilling.

1.2 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - .2 Ontario Provincial Standard Specifications (OPSS)
 - .1 OPSS.MUNI 1010 - (November 2013) – Material Specification for Aggregates – Base, Subbase, Select Subgrade, and Backfill Material.

Part 2 Products

2.1 MATERIALS

- .1 Granular sub-base material: Granular B Type II to OPSS.MUNI 1010.

Part 3 Execution

3.1 PROOF ROLLING SUBGRADE

- .1 For proof rolling use standard roller of minimum 45400 kg gross mass.
- .2 Obtain approval from Departmental Representative to use non-standard proof rolling equipment.
- .3 Proof roll at level in sub-base as indicated. If non-standard proof rolling equipment is approved, Departmental Representative to determine level of proof rolling.
- .4 Make sufficient passes with proof roller to subject every point on surface to three separate passes.
- .5 Where proof rolling reveals areas of defective sub grade:
 - .1 Remove sub grade material to depth and extent as directed by Departmental Representative.
 - .2 Backfill excavated sub grade with sub-base material and compact in accordance with this section.

3.2 PLACING

- .1 Place granular sub-base after sub grade has been proof rolled and inspected and approved by Departmental Representative.
- .2 Construct granular sub-base to depth and grade in areas indicated.
- .3 Ensure no frozen material is placed.
- .4 Place material only on clean unfrozen surface, free from snow or ice.
- .5 Begin spreading sub-base material on crown line or high side of one-way slope.
- .6 Place granular sub-base materials using methods that do not lead to segregation or degradation.
- .7 For spreading and shaping material, use spreader boxes having adjustable templates or screeds that will place material in uniform layers of required thickness.
- .8 Place material to full width in uniform layers not exceeding 150 mm compacted thickness. Departmental Representative may authorize thicker lifts if specified compaction can be achieved.
- .9 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
- .10 Remove and replace portion of layer in which material has become segregated during spreading.

3.3 COMPACTION

- .1 Compaction equipment to be capable of obtaining required material densities.
- .2 Equipped with device that records hours of actual work, not motor running hours.
- .3 Sub-base material for roadway sub-base: granular sub-base material. Compact to 100% of standard Proctor maximum dry density as per ASTM D698.
- .4 Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base.
- .5 Apply water as necessary during compaction to obtain specified density.
- .6 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Departmental Representative.
- .7 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.4 SITE TOLERANCES

- .1 Finished sub-base surface to be within 10 mm of elevation as indicated but not uniformly high or low.

3.5 PROTECTION

- .1 Maintain finished sub-base in condition conforming to this section until succeeding base is constructed, or until granular sub-base is accepted by Departmental Representative.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 32 11 19 - Granular Sub-base.

1.2 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
- .2 Ontario Provincial Standard Specifications (OPSS)
 - .1 OPSS 1010.MUNI (November 2013) – Material Specification for Aggregates – Base, Subbase, Select Subgrade, and Backfill Material.

Part 2 Products

2.1 MATERIALS

- .1 Granular base material: Granular A to OPSS.MUNI 1010.

Part 3 Execution

3.1 SEQUENCE OF OPERATION

- .1 Place granular base after sub-base surface is inspected and approved by Departmental Representative.
- .2 Placing
 - .1 Construct granular base to depth and grade in areas indicated.
 - .2 Ensure no frozen material is placed.
 - .3 Place material only on clean unfrozen surface, free from snow and ice.
 - .4 Begin spreading base material on crown line or on high side of one-way slope.
 - .5 Place material using methods, which do not lead to segregation or degradation of aggregate.
 - .6 For spreading and shaping material, use spreader boxes having adjustable templates or screeds, which will place material in uniform layers of required thickness.
 - .7 Place material to full width in uniform layers not exceeding 150 mm compacted thickness. Departmental Representative may authorize thicker lifts if specified compaction can be achieved.
 - .8 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
 - .9 Remove and replace that portion of layer in which material becomes segregated during spreading.

.3 **Compaction Equipment**

- .1 Compaction equipment to be capable of obtaining required material densities.

.4 **Compacting**

- .1 Granular base material. Compact to 100% of standard Proctor maximum dry density as per ASTM D698.
- .2 Shape and roll alternately to obtain smooth, even and uniformly compacted base.
- .3 Apply water as necessary during compacting to obtain specified density.
- .4 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Departmental Representative.
- .5 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.2 SITE TOLERANCES

- .1 Finished base surface to be within plus or minus 10 mm of established grade and cross section but not uniformly high or low.

3.3 PROTECTION

- .1 Maintain finished base in condition conforming to this Section until succeeding material is applied or until acceptance by Departmental Representative.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 32 11 19 – Granular Sub Base
- .2 Section 32 11 23 – Aggregate Base Courses

1.2 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.5-M91(March 1999), Low Flash Petroleum Spirits Thinner (Reaffirmation of December 1991).
 - .2 CAN/CGSB-1.74-2001, Alkyd Traffic Paint.
- .3 Ontario Provincial Standard Specifications (OPSS)
 - .1 OPSS 302-November 2007, Construction Specification for Primary Granular Base.
 - .2 OPSS 310-April 2008, Construction Specification for Hot Mixed, Hot Laid Asphaltic Concrete Paving and Hot Mix Patching.
 - .3 OPSS 314-November 2004, Construction Specification for Untreated Granular, Subbase, Base, Surface Shoulder and Stockpiling.
 - .4 OPSS 1003-November 2006, Material Specification for Aggregates - Hot Mix Asphalt.
 - .5 OPSS.PROV 1101- April 2007, Material Specification for Performance Graded Asphalt Cement.
 - .6 OPSS 1103-November 2007, Material Specification for Emulsified Asphalt.
 - .7 OPSS 1150-November 2002, Material Specification for Hot Mixed, Hot Laid Asphalt Concrete.

1.3 WASTE MANAGEMENT AND DISPOSAL

- .1 Dispose of unused paint and paint thinner materials at official hazardous material collections site.
- .2 Do not dispose of unused paint and paint thinner material into sewer system, into streams, lakes, onto ground or in other location where it will pose health environmental hazard.
- .3 Divert unused asphalt from landfill to facility capable of recycling materials.

Part 2 Products

2.1 MATERIALS

- .1 Tack coat: SS-1 to OPSS 1103.
- .2 Asphalt concrete: to OPSS 1150.
- .3 Asphalt cement: performance graded (PG) 58-34 to OPSS.PROV 1101.
- .4 Asphalt concrete mix:
 - .1 Wear course: HL3
 - .2 Base course: HL8.
- .5 Traffic paint: yellow and white to CAN/CGSB-1.74.
- .6 Paint thinner: to CAN/CGSB-1.5.
- .7 Granular sub base: refer to Section 32 11 19 – Granular Sub Base
- .8 Granular base: refer to Section 32 11 23 – Aggregate Base Courses

Part 3 Execution

3.1 FOUNDATIONS

- .1 Foundations for trench reinstatement:
 - .1 Granular sub base: as indicated.
 - .2 Granular base: as indicated.
- .2 Construction of granular foundations: OPSS 314.

3.2 PAVEMENT THICKNESS

- .1 Pavements for trench reinstatement:
 - .1 Wear course: HL3, thickness as indicated.
 - .2 Base course: HL8, thickness as indicated.
- .2 Pavements for overlays:
 - .1 Wear course: HL3, thickness as indicated.

3.3 PAVEMENT CONSTRUCTION

- .1 Construction of asphalt concrete: OPSS 310.

3.4 EQUIPMENT

- .1 Pavers: mechanical grade controlled self-powered pavers capable of spreading mix within specified tolerances, true to line, grade and crown indicated.
- .2 Rollers: sufficient number of type and weight to obtain specified density of compacted mix.

- .3 Haul trucks: sufficient number and of adequate size, speed and condition to ensure orderly and continuous operation and as follows:
 - .1 Boxes with tight metal bottoms.
 - .2 Covers of sufficient size and weight to completely cover and protect asphalt mix when truck fully loaded.
 - .3 In cool weather or for long hauls, insulate entire contact area of each truck box.
 - .4 Use only trucks that can be weighed in single operation on scales supplied.

- .4 Hand tools:
 - .1 Lutes or rakes with covered teeth for spreading and finishing operations.
 - .2 Tamping irons having mass not less than 12kg and bearing area not exceeding 310cm² for compacting material along curbs and other structures inaccessible to roller. Mechanical compaction equipment, when approved by Departmental Representative may be used instead of tamping irons.
 - .3 Straight edges, 4.5 m in length, to test finished surface.

3.5 TACK COAT

- .1 Apply asphalt tack coat only on clean and dry surface. Obtain Departmental Representative's approval of surface before applying asphalt tack coat.
- .2 Dilute asphalt emulsion with water as required for application. Mix thoroughly by pumping or other method approved by Departmental Representative.
- .3 Apply asphalt tack coat evenly to pavement surface.
- .4 Paint contact surfaces of curbs, manholes and like structures with thin, uniform coat of asphalt tack coat material.
- .5 Do not apply asphalt tack coat when air temperature is less than 10°C or when rain is forecast within 2 hours of application.
- .6 Apply asphalt tack coat only to surfaces that are expected to be overlaid on same day.
- .7 Evenly distribute localized excessive deposits of tack coat by brooming as directed by Departmental Representative.
- .8 Keep traffic off tacked areas until asphalt tack coat has set.
- .9 Re-tack contaminated or disturbed areas as directed by Departmental Representative.
- .10 Permit asphalt tack coat to set before placing asphalt pavement.

3.6 TRANSPORTATION OF MIX

- .1 Transport mix to job site in vehicles cleaned of foreign material.
- .2 Paint or spray truck beds with limewater, soap or detergent solution, or non-petroleum based commercial product, at least daily or as required. Elevate truck bed and thoroughly drain. No excess solution to remain in truck bed.
- .3 Deposit mix from surge or storage silo to trucks in multiple drops to reduce segregation. Do not dribble mix into trucks.
- .4 Deliver material to paver at uniform rate and in an amount within capacity of paving and compacting equipment.
- .5 Deliver loads continuously in covered vehicles and immediately spread and compact. Deliver and place mixes at temperature within range as directed by Departmental Representative, but not less than 135 °C.

3.7 PLACING

- .1 Obtain Departmental Representative's approval of base and existing surface and tack coat prior to placing asphalt. Prior to laying mix, clean surfaces of loose and foreign material.
- .2 Place asphalt concrete to thicknesses, grades and lines as indicated.
- .3 Placing conditions:
 - .1 Place asphalt mixtures only when air temperature is above 5 °C.
 - .2 When temperature of surface on which material is to be placed falls below 10 °C, provide extra rollers as necessary to obtain required compaction before cooling.
 - .3 Do not place hot-mix asphalt when pools of standing water exist on surface to be paved, during rain, or when surface is damp.
- .4 Where possible do tapering and levelling where required in lower lifts. Overlap joints by not less than 300mm.
- .5 Commence spreading at high side of pavement or at crown and span crowned centerlines with initial strip.
- .6 Spread and strike off mixture with self propelled mechanical finisher.
 - .1 Construct longitudinal joints and edges true to line markings. Position and operate paver to follow established line closely.
 - .2 When using pavers in echelon, have first paver follow marks or lines, and second paver follow edge of material placed by first paver. Work pavers as close together as possible.
 - .3 Maintain constant head of mix in auger chamber of paver during placing.
 - .4 If segregation occurs, immediately suspend spreading operation until cause is determined and corrected.
 - .5 Correct irregularities in alignment left by paver by trimming directly behind machine.
 - .6 Correct irregularities in surface of pavement course directly behind paver. Remove by shovel or lute excess material forming high spots. Fill and smooth indented areas with hot mix. Do not broadcast material over such areas.
 - .7 Do not throw surplus material on freshly screeded surfaces.

- .7 When hand spreading is used:
 - .1 Use approved wood or steel forms, rigidly supported to assure correct grade and cross section. Use measuring blocks and intermediate strips to aid in obtaining required cross-section.
 - .2 Distribute material uniformly. Do not broadcast material.
 - .3 During spreading operation, thoroughly loosen and uniformly distribute material by lutes or covered rakes. Reject material that has formed into lumps and does not break down readily.
 - .4 After placing and before rolling, check surface with templates and straightedges and correct irregularities.
 - .5 Provide heating equipment to keep hand tools free from asphalt. Control temperature to avoid burning material. Do not use tools at higher temperature than temperature of mix being placed.

3.8 COMPACTING

- .1 Do not change rolling pattern unless mix changes or lift thickness changes. Change rolling pattern only as directed by Departmental Representative.
- .2 Roll asphalt continuously to achieve a compaction between 92% to 96.5% of the maximum relative density when tested in accordance with the requirements of OPSS 310.
- .3 General:
 - .1 Provide at least two rollers and as many additional rollers as necessary to achieve specified pavement density. When more than two rollers are required, one roller must be pneumatic tired type.
 - .2 Start rolling operations as soon as placed mix can bear weight of roller without excess displacement of material or cracking of surface.
 - .3 Operate roller slowly initially to avoid displacement of material. Do not exceed 5 km/h for breakdown and intermediate rolling for static steel-wheeled and pneumatic tired rollers. Do not exceed 9km/h for finish rolling.
 - .4 For overlays, adjust speed and vibration frequency of vibratory rollers to produce a minimum of 25 impacts per meter of travel, but not exceeding 40 impacts per meter.
 - .5 Overlap successive passes of roller by minimum of 200 mm and vary pass lengths.
 - .6 Keep wheels of roller slightly moistened with water to prevent pick-up of material but do not over-water.
 - .7 Do not stop vibratory rollers on pavement that is being compacted with vibratory mechanism operating.
 - .8 Do not permit heavy equipment or rollers to stand on finished surface before it has been compacted and has thoroughly cooled.
 - .9 After traverse and longitudinal joints and outside edge have been compacted, start rolling longitudinally at low side and progress to high side. Ensure that all points across width of pavement receive essentially equal numbers of passes of compactors.
 - .10 When paving in echelon, leave unrolled 50 to 75mm of edge which second paver is following and roll when joint between lanes is rolled.
 - .11 Where rolling causes displacement of material, loosen affected areas at once with lutes or shovels and restore to original grade of loose material before re-rolling.
- .4 Breakdown rolling:
 - .1 Commence breakdown rolling with immediately following rolling of transverse and longitudinal joint and edges.

- .2 Operate rollers as close to paver as necessary to obtain adequate density without causing undue displacement.
- .3 Operate breakdown roller with drive roll or wheel nearest finishing machine.
- .4 Use only experienced roller operators.

- .5 Intermediate rolling:
 - .1 Use pneumatic-tired, steel wheel or vibratory rollers and follow breakdown rolling as closely as possible and while paving mix temperature allows maximum density from this operation.
 - .2 Rolling to be continuous after initial rolling until mix placed has been thoroughly compacted.

- .6 Finish rolling:
 - .1 Accomplish finish rolling with two-axle or three-axle tandem steel wheeled rollers while material is still warm enough for removal of roller marks. If necessary to obtain desired surface finish, use pneumatic-tired rollers as directed by Departmental Representative.
 - .2 Conduct rolling operations in close sequence.

3.9 JOINTS

- .1 General:
 - .1 Remove surplus material from surface of previously laid strip. Do not deposit on surface of freshly laid strip.
 - .2 Paint contact surfaces of existing structures such as manholes, curbs or gutters with bituminous material prior to placing adjacent pavement.

- .2 Transverse joints:
 - .1 Offset transverse joint in succeeding lifts by at least 600 mm.
 - .2 Cut back to full depth vertical face and tack face with thin coat of hot asphalt prior to continuing paving.
 - .3 Compact transverse joints to provide smooth riding surface. Use methods to prevent rounding of compacted surface at joints.

- .3 Longitudinal joints:
 - .1 Offset longitudinal joints in succeeding lifts by at least 150 mm.
 - .2 Cold joint is defined as joint where asphalt mix is placed, compacted and left to cool below 100°C prior to paving of adjacent lane.
 - .3 Overlap previously laid strip with spreader by 25 to 50 mm.
 - .4 Before rolling, carefully remove and discard coarse aggregate in material overlapping joint with lute or rake.
 - .5 Roll longitudinal joints directly behind paving operation.
 - .6 When rolling with static or vibratory rollers, have most of drum width ride on newly placed lane with remaining 150mm extending onto previously placed and compacted lane.

- .4 Construct feather joints so that thinner portion of joint contains fine graded material obtained by changed mix design or by raking out coarse aggregate in mix. Place and compact joint so that joint is smooth and without visible breaks in grade. Location of feather joints as indicated.

3.10 TOLERANCES

- .1 Finished asphalt surface to be within 5 mm of design elevation but not uniformly high or low.
- .2 Finished asphalt surface not to have irregularities exceeding 5 mm when checked with 4.5m straight edge placed in any direction.

3.11 DEFECTIVE WORK

- .1 Correct irregularities that develop before completion of rolling by loosening surface mix and removing or adding material as required. If irregularities or defects remain after final compaction, remove surface course promptly and lay new material to form true and even surface and compact immediately to specified density.
- .2 Repair areas showing checking, rippling, or segregation.
- .3 Adjust roller operation and screed settings on paver to prevent further defects such as rippling and checking of pavement.

3.12 TRAFFIC MARKINGS

- .1 Paint traffic markings in accordance with manufacturers recommendations and as indicated.
- .2 Use paint thinner in accordance with manufacturer's requirements.
- .3 Application:
 - .1 Lay out pavement markings as indicated.
 - .2 Unless otherwise approved by Departmental Representative, apply paint only when air temperature is above 10°C, wind speed is less than 60km/h and no rain is forecast within next 4h.
 - .3 Apply traffic paint evenly at rate of 3m² /L.
 - .4 Do not thin paint unless approved by Departmental Representative.
 - .5 Paint lines to be of uniform colour and density with sharp edges.
 - .6 Thoroughly clean distributor tank before refilling with paint of different colour.
- .4 Tolerance:
 - .1 Paint markings to be within plus or minus 12mm of dimensions indicated.
- .5 Protection of Completed Works:
 - .1 Protect pavement markings until dry.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-15.1-92, Calcium Chloride.

1.2 DELIVERY STORAGE AND HANDLING

- .1 Supply calcium chloride in quantities and at times required to control the spread of dust, more often if directed by Departmental Representative.
- .2 Deliver calcium chloride to site in moisture-proof bags. Indicate name of manufacturer, name of product, net weight or mass, and percentage of calcium chloride guaranteed by manufacturer.
- .3 Store bags of calcium chloride in weather- proof enclosures.

Part 2 Products

2.1 MATERIALS

- .1 Calcium chloride, Type I: to CAN/CGSB-15.1, flake.
- .2 Water: to Departmental Representative's approval.

Part 3 Execution

3.1 APPLICATION

- .1 Use of either calcium chloride or water is acceptable as means of dust control:
 - .1 Apply calcium chloride with equipment approved by Departmental Representative.
 - .2 Apply water with distributors equipped with means of shut-off and with spray system to ensure uniform application.
- .2 Do not use water during adverse temperatures.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 03 30 05 - Cast-in-Place Concrete.
- .2 Section 31 23 10 - Excavating, Trenching and Backfilling.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CSA-A23.1-04/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

Part 2 Products

2.1 MATERIALS

- .1 Concrete mixes and materials: to Section 03 30 05 - Cast-in-Place Concrete.
- .2 Joint filler: to Section 03 30 05 - Cast-in-Place Concrete.
- .3 Granular base material: to Section 32 11 23 – Aggregate Base Course.
- .4 Non-staining mineral type form release agent: chemically active release agents containing compounds that react with free lime to provide water soluble soap.
- .5 Joint filler and Curing Compound: to Section 03 30 05 - Cast-in-Place Concrete.

Part 3 Execution

3.1 GRADE PREPARATION

- .1 Do grade preparation work in accordance with Section 31 23 10 - Excavating, Trenching and Backfilling.

3.2 GRANULAR BASE

- .1 Obtain Departmental Representative's approval of subgrade before placing granular base.
- .2 Place granular base material to lines, widths, and depths as indicated to re-instate trench excavations to existing conditions.
- .3 Compaction of granular base: refer to Section 32 11 23 – Aggregate Base Courses.

3.3 CONCRETE

- .1 Obtain Departmental Representative's approval of granular base prior to placing concrete.

- .2 Do concrete work in accordance with Section 03 30 05 - Cast-in-Place Concrete.
- .3 Immediately after floating, give sidewalk surface uniform broom finish to produce regular corrugations not exceeding 2 mm deep, by drawing broom in direction normal to centre line.
- .4 Provide edging as indicated with 25 mm radius edging tool.

3.4 TOLERANCES

- .1 Finish surfaces to within 3 mm in 3 m as measured with 3 m straightedge placed on surface.

3.5 EXPANSION AND CONTRACTION JOINTS

- .1 For sidewalks:
 - .1 Install tooled transverse contraction joints after floating, when concrete is stiff, but still plastic, at intervals of 1.5 m.
 - .2 Install expansion joints at intervals of 6 m.
 - .3 Install expansion joints around manholes and catch basins and along length adjacent to concrete curbs, catch basins, buildings, or permanent structure.
- .2 For curbs and gutters:
 - .1 Install expansion joints at intervals of 6 m.
 - .2 When sidewalk is adjacent to curb, make joints of curb, gutters and sidewalk coincide.
 - .3 Install joint filler in expansion joints in accordance with Section 03 30 05 - Cast-in-Place Concrete.

3.6 CURING

- .1 Cure concrete by adding moisture continuously in accordance with CSA-A23.1 to exposed finished surfaces for at least 1 day after placing.
- .2 Where burlap is used for moist curing, place two prewetted layers on concrete surface and keep continuously wet during curing period.
- .3 Do cold weather concrete work in accordance with CSA-A23.1.

3.7 BACKFILL

- .1 Allow concrete to cure for 7 days prior to backfilling.
- .2 Backfill as indicated to match existing grades, in accordance with Section 31 23 10 - Excavating, Trenching and Backfilling.

END OF SECTION

Part 1 General

1.1 WASTE MANAGEMENT AND DISPOSAL

- .1 Divert unused soil amendments from landfill to official hazardous material collections site.
- .2 Do not dispose of unused soil amendments into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

Part 2 Products

2.1 TOPSOIL

- .1 Topsoil for seeded areas: mixture of particulates, microorganisms and organic matter that provides suitable medium for supporting intended plant growth.
 - .1 Soil texture based on The Canadian System of Soil Classification, to consist of 20 to 70 % sand, minimum 7 % clay, and contain 2 to 10 % organic matter by weight.
 - .2 Contain no toxic elements or growth inhibiting materials.
 - .3 Finished surface free from:
 - .1 Debris and stones over 50 mm diameter.
 - .2 Course vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.
 - .4 Consistence: friable when moist.
- .2 Site Excavated Topsoil:

Topsoil excavated from site, screened to remove debris and stones over 50mm diameter.

2.2 SOURCE QUALITY CONTROL

- .1 Advise Departmental Representative of sources of topsoil to be utilized.
- .2 Contractor is responsible for amendments to supply topsoil as specified.

Part 3 Execution

3.1 Preparation of Existing Grade

- .1 Verify that grades are correct. If discrepancies occur, notify Departmental Representative and do not commence work until instructed by Departmental Representative.
- .2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.
- .3 Remove debris, roots, branches, stones in excess of 50 mm diameter and other deleterious materials. Remove soil contaminated with calcium chloride, toxic materials and petroleum

products. Remove debris that protrudes more than 75 mm above surface. Dispose of removed material off site.

- .4 Cultivate entire area which is to receive topsoil to minimum depth of 100 mm. Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

3.2 Placing and Spreading of Topsoil

- .1 Place topsoil after Departmental Representative has accepted sub grade.
- .2 Spread topsoil as indicated to following minimum depths after settlement.
 - .1 150 mm for seeded areas.
 - .2 150 mm for sodded areas.

3.3 Finish Grading

- .1 Grade to eliminate rough spots and low areas and ensure positive drainage. Prepare loose friable bed by means of cultivation and subsequent raking.
- .2 Consolidate topsoil to required bulk density using equipment approved by Departmental Representative. Leave surfaces smooth, uniform and firm against deep foot printing.

3.4 ACCEPTANCE

- .1 Departmental Representative will inspect and test topsoil in place and determine acceptance of material, depth of topsoil and finish grading.

3.5 SURPLUS MATERIAL

- .1 Dispose of materials except topsoil not required off site.

3.6 CLEANING

- .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 32 91 19.13 - Topsoil Placement and Grading.

1.2 REFERENCES

- .1 Department of Justice Fertilizer Act (R.S., 1985, c. F-10) and Fertilizer Regulation (C.R.C., c666).

1.3 SCHEDULING

- .1 Schedule sod laying to coincide with preparation of soil surface.
- .2 Schedule sod installation when frost is not present in ground.

Part 2 Products

2.1 MATERIALS

- .1 Number One Turf Grass Nursery Sod: sod that has been especially sown and cultivated in nursery fields as turf grass crop.
 - .1 Turf Grass Nursery Sod types:
 - .1 Number One Kentucky Bluegrass Sod: Nursery Sod grown solely from seed of cultivars of Kentucky Bluegrass, containing not less than 50% Kentucky Bluegrass cultivars.
 - .2 Turf Grass Nursery Sod quality:
 - .1 Not more than 2 broadleaf weeds or 10 other weeds per 40 square metres.
 - .2 Density of sod sufficient so that no soil is visible from height of 1500 mm when mown to height of 50 mm.
 - .3 Mowing height limit: 35 to 65 mm.
 - .4 Soil portion of sod: 6 to 15 mm in thickness.
 - .2 Water:
 - .1 Supplied by contractor free of contamination and impurities.
 - .3 Fertilizer:
 - .1 To Canada "Fertilizers Act" and "Fertilizers Regulations".

2.2 SOURCE QUALITY CONTROL

- .1 Obtain approval from Departmental Representative of sod at source.
- .2 When proposed source of sod is approved, use no other source without written authorization.

Part 3 Execution

3.1 PREPARATION

- .1 Verify that grades are correct and prepared in accordance with Section 32 91 21 - Topsoil Placement and Grading. If discrepancies occur, notify Departmental Representative and do not commence work until instructed by Departmental Representative.
- .2 Do not perform work under adverse field conditions such as frozen soil, excessively wet soil or soil covered with snow, ice, or standing water.
- .3 Fine grade surface free of humps and hollows to smooth, even grade, to match existing grades, plus or minus 8mm, surface to drain naturally.
- .4 Remove and dispose of weeds; debris; stones 50 mm in diameter and larger; soil contaminated by oil, gasoline and other deleterious materials; off site as directed by Departmental Representative.

3.2 SOD PLACEMENT

- .1 Lay sod within 24 hours of being lifted if air temperature exceeds 20°C.
- .2 Lay sod sections in rows, joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp implements.
- .3 Roll sod as directed by Departmental Representative. Provide close contact between sod and soil by light rolling. Use of heavy roller to correct irregularities in grade is not permitted.

3.3 MAINTENANCE DURING ESTABLISHMENT PERIOD

- .1 Perform following operations from time of installation until acceptance.
- .2 Water sodded areas in sufficient quantities and at frequency required to maintain optimum soil moisture condition to depth of 75 to 100 mm.
- .3 Cut grass to 50 mm when or prior to it reaching height of 75 mm. Remove clippings which will smother grassed areas as directed by Departmental Representative.
- .4 Maintain sodded areas weed free.
- .5 Fertilize areas as required to ensure establishment of sod. Spread half of required amount of fertilizer in one direction and remainder at right angles and water in well.

3.4 ACCEPTANCE

- .1 Turfgrass Nursery Sod areas will be accepted by Departmental Representative provided that: Sodded areas are properly established.
 - .1 Sodded areas are properly established.
 - .2 Sod is free of bare and dead spots.
 - .3 No surface soil is visible from height of 1500 mm when grass has been cut to height of 50 mm.
 - .4 Sodded areas have been cut minimum 2 times prior to acceptance.

- .2 Areas sodded in fall will be accepted in following spring one month after start of growing season provided acceptance conditions are fulfilled.

END OF SECTION